

Let the sum of the square of the digits of a positive integer  $S_0$  be represented by  $S_1$ . In a similar way, let the sum of the squares of the digits of  $S_1$  be represented by  $S_2$  and so on. If  $S_i = 1$  for some  $i \geq 1$ , then the original integer  $S_0$  is said to be Happy number. A number, which is not happy, is called Unhappy number. For example 7 is a Happy number since  $7 \rightarrow 49 \rightarrow 97 \rightarrow 130 \rightarrow 10 \rightarrow 1$  and 4 is an Unhappy number since  $4 \rightarrow 16 \rightarrow 37 \rightarrow 58 \rightarrow 89 \rightarrow 145 \rightarrow 42 \rightarrow 20 \rightarrow 4$ .

## Input

The input consists of several test cases, the number of which you are given in the first line of the input. Each test case consists of one line containing a single positive integer  $N$  smaller than  $10^9$ .

## Output

For each test case, you must print one of the following messages:

Case # $p$ :  $N$  is a Happy number.

Case # $p$ :  $N$  is an Unhappy number.

Here  $p$  stands for the case number (starting from 1). You should print the first message if the number  $N$  is a happy number. Otherwise, print the second line.

## Sample Input

```
3
7
4
13
```

## Sample Output

```
Case #1: 7 is a Happy number.
Case #2: 4 is an Unhappy number.
Case #3: 13 is a Happy number.
```